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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/049,486	02/28/2002	Yelin Xu	FP01074US	4087

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EXAMINER	
OWENS, DOUGLAS W	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 01/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/049,486	XU ET AL.	
	Examiner	Art Unit	
	Douglas W Owens	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-15 and 17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8-11 and 17* is/are rejected.

7)☒ Claim(s) *5,6 and 12-15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claim 6 is objected to because of the following informalities:

there is insufficient antecedent basis for the term "said two walls" in line 2 of the claim.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 17 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

4. Claim 17 requires that the semiconductor material between the metal plates be a liquid semiconductor. There is no disclosure of what materials the Applicant has contemplated using that would is a liquid and exhibits semiconductive properties. The Applicant has failed to disclose how such a liquid could be incorporated into the parallel plate diode. How would the liquid semiconductor layer remain between the metal plates? Is there some modification required to the plates that would enable the liquid to remain between the plates? One having ordinary skill in the art would be required to perform undue experimentation to reduce the claimed invention to practice.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Claim 10 recites the limitation "...of each diode..." in line 2. There is insufficient antecedent basis for this limitation in the claim. The term suggests more than one diode, but only one diode has been previously claimed.

8. Claim 10 recites the limitation "...the well shape cavity..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1 – 4, 8, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent No. 5,365,102 to Mehrotra et al.

Regarding claim 1, Mehrotra et al. teaches a parallel plate diode (Fig. 6F., for example), comprising:

two thin plate metal electrodes (18, 20; Col. 8, lines 48 and 49);

semiconductor material (12c,12d) contacting the metal electrodes; and

a plurality of recesses (14) in one of the metal electrodes, wherein the recesses are in a surface contacting the semiconductor material.

Mehrotra et al. does not explicitly teach that the concentration of carriers in the semiconductor material is 20% or less that that of the electrons in the metal. The device taught by Mehrotra et al. would have inherently had this feature since the material and doping (carrier) concentration is identical to that of the claimed invention.

Mehrotra et al. does not teach recesses that have a diameter of less than 4 microns. Mehrotra et al. is silent with respect to the diameter of the recesses. Therefore, one having ordinary skill in the art would have been required to arrive at the optimal diameter through routine experimentation. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454; 456, 105 USPQ 233, 235 (CCPA 1955).

Regarding claim 2, Mehrotra et al. teaches a diode, wherein the recesses are well-shaped cavities.

Regarding claim 3, Mehrotra et al. teaches a diode, wherein the cross section of the well-shaped cavity is a square, circular or rectangle (Col. 5, lines 63 – 65).

Regarding claim 4, Mehrotra et al. teaches a diode, wherein the cross section of the well-shaped cavity is a groove shape (Col. 5, lines 63 – 65).

Regarding claim 8, Mehrotra et al. does not teach attaching a substrate to an insulated substrate. Insulated substrates are commonly used in the art, and are desirable because they can reduce parasitic capacitance, resulting in faster devices. It would have been obvious to one having ordinary skill in the art to attach the diode to an insulated substrate since it is desirable to produce fast devices.

Regarding claim 9, Mehrotra et al. does not teach a glass substrate. Glass substrates are a known insulative substrate that is commonly used in the art. It would have been obvious to one of ordinary skill to use a glass substrate since it is a known material that is well suited for the intended use and would have provided a reliable insulative substrate, as discussed above. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Regarding claim 11, Mehrotra et al. does not teach a diode, wherein the metal electrode is an alloy of iron, nickel and cobalt having a thermal expansion coefficient of about $3x10^{-6}$. It would have been obvious to one having ordinary skill in the art to use a commercially available alloy, such as a KOVAR alloy, which has the above properties, since it is a known material that is well suited for the intended use, as discussed above. It is further desirable to provide reliable materials for use in metal electrodes.

Allowable Subject Matter

11. Claims 5 and 12 – 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

12. Applicant's arguments filed October 17, 2003 have been fully considered but they are not persuasive.

The Applicant argues that liquid semiconductor materials are well known in the art and relies on pg. 6, lines 18 – 29 of the written disclosure for support. The passage

referred to by the Applicant only mentions that liquid semiconductors can be used, but fails to suggest actual materials that are contemplated for use that are liquid and have semiconductive properties as well as a method of containing the liquid material between the plates. Moreover, the mere allegation that the specification is enabling is insufficient to overcome an enablement rejection under 35 USC 112, first paragraph. "Determining enablement is a question of law based on underlying factual findings" *In re Vaeck*, 947 F.2d 488, 495 USPQ2d 1438, 1444 (Fed. Cir. 1991); *Atlas Powder Co. v. E.I. du Pont de Nemours & Co.*, 750 F.2d 1569, 1576, 224 USPQ 409, 413 (Fed Cir. 1984). The Applicant may overcome an enablement rejection by providing convincing evidence to the contrary, such as but not limited to, suitable proofs, a declaration (the weight given depending on factual evidence), or prior art examples (See MPEP 2164.05 for further discussion).

The Applicant agrees that Mehrotra teaches similar materials for the diode, but argues that the doping concentrations are very different. Mehrotra teaches doping the semiconductor material N+ and N type. The semiconductor material of the claimed invention is doped N-type (page 6, lines 9 – 11), "...including high-resistance type, medium-resistance type, low-resistance type...". N+ and N type are considered low-resistance and medium resistance respectively, as is known in the art. Therefore, the concentration of carriers is indeed 20% or less than the electrons in the metal, since the material and doping concentration of carriers is indeed the same. With respect to the insulting material (16a and 16b) on the walls of the recesses taught by Mehrotra, there is nothing in the claims to preclude this additional layer of material.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

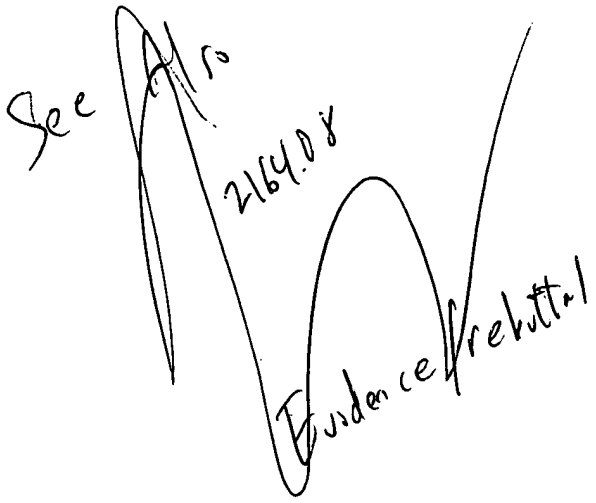
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on 703-308-1690. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

DWO



Determining enablement is a question of law based on underlying factual findings. *In re Vaeck*, 947 F.2d 488, 495, 20 USPQ2d 1438, 1444 (Fed. Cir. 1991); *Atlas Powder Co. v. E.I. du Pont de Nemours & Co.*, 750 F.2d 1569, 1576, 224 USPQ 409, 413 (Fed. Cir. 1984).